



SERVICE DATA

CHAIN SAW

ECHO: CS-610

STAGE II MODEL

(Serial number : 37000001 and after)

INTRODUCTION

We are constantly working on technical improvement of our products. For this reason, technical data, equipment and design are subject to change without notice. All specifications and directions in this SERVICE DATA are based on the latest product information available at the time of publication.

ECHO SERVICE MANUAL Ord. 401-31 (Model : CS-600) contains lots of information for servicing this model.

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Reference No. **01-59D-00**
ISSUED : 201201



1 SERVICE INFORMATION

1-1 Specifications

Dimensions	Length	mm(in)	448 (17.64)
	Width	mm(in)	246 (9.69)
	Height	mm(in)	296 (11.65)
Dry weight*		kg(lb)	6.0 (13.2)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder Ventilated piston, Semi-automatic decompression
	Rotation		Clockwise as viewed from the output end
	Displacement	cm ³ (in ³)	59.8 (3.649)
	Bore	mm(in)	45.0 (1.772)
	Stroke	mm(in)	37.6 (1.480)
	Compression ratio		7.2
Carburettor	Type		Diaphragm horizontal-draught
	Model		Walbro HDA-268A
	Venturi size-Throttle bore	mm(in)	15.08 - 19.03 (0.594 - 0.749)
Ignition	Type		CDI (Capacitor discharge ignition) system Digital magneto
	Spark plug		BPMR8Y
Exhaust	Muffler type		Spark arrester muffler
Starter	Type		Automatic rewind
	Rope diameter x length	mm(in)	4.0 x 950 (0.15 x 37.4) : Kevlar
Fuel	Type		Premixed two-stroke fuel
	Mixture ratio		50 : 1 (2 %)
	Petrol		Minimum 89 octane gasoline
	Two-stroke air cooled engine oil		ISO-L-EGD (ISO/CD13738), JASO FC/FD
	Tank capacity	L (U.S.fl.oz.)	0.57 (19.3)
Clutch	Type		Inboard clutch : Centrifugal, 3-shoe slide with 3-tension spring
Guide bar / Saw chain lubrication type			Automatic with volume adjuster
	Tank capacity, oil	L (U.S.fl.oz.)	0.3 (10.1)
Sprocket	Type		Floating rim
	Number of teeth		7
	Pitch	in	3/8

* Without guide bar and saw chain.

Carlton Saw chain A2LM
Oregon Saw chain 73LGX

Cutting devices				
Guide bar	Type	45RS58-3/8E	50RS58-3/8E	60RS58-3/8E
	Called length	cm	45	50
	Gauge	in	0.058	
Saw chain	Number of drive links	64	72	84
	Pitch	in	3/8	
	Gauge	in	0.058	

1-2 Technical data

Engine			
Idling speed	r/min	2,800	- 200 + 400
Wide open throttle speed*	r/min	11,800 - 12,800	
Clutch engagement speed	r/min	4,000	
Engagement Minimum†	r/min	3,500	
Compression pressure	MPa (kgf/cm ²) (psi)	1.01 (10.3) (146)	
Ignition system			
Spark plug gap	mm(in)	0.6 - 0.7 (0.024 - 0.028)	
Minimum secondary voltage at 1,500 r/min	kV	15	
Primary coil resistance	kΩ	117 - 121	
Secondary coil resistance	kΩ	2.5 - 2.9	
Pole shoe air gaps	mm(in)	0.30 - 0.40 (0.012 - 0.016)	
Ignition timing	at 3,000 r/min	°BTDC	6
	at 8,000 r/min	°BTDC	24
	at 10,000 r/min	°BTDC	30
	at 12,000 r/min	°BTDC	27
PET-9000	Parameter 1	332	
	Parameter 2	05	
Carburettor			
Idle adjust screw initial setting	turn in**	1	
L mixture needle initial setting	turns out***	1 3/4	
H mixture needle initial setting	turns out***	3/4	
Test Pressure, minimum	MPa (kgf/cm ²) (psi)	0.05 (0.5) (7.0)	
Metering lever height	mm(in)	Flush with diaphragm seat	
Chain oil discharge volume at 7,000 r/min			Adjustable 1.5 - 13 (0.05 - 0.39)
mL/min(U.S.fl.oz./min)			(Factory set 7.0 mL/min)

BTDC: Before top dead centre.

*With 50 cm guide bar and properly adjusted saw chain.

**Set idle adjust screw to the point that its tip just contacts throttle plate before initial setting.

***Turn L/H mixture needles anticlockwise from point that needle is lightly seated.

† If clutch engagement speed is lower than minimum clutch engagement speed, replace clutch assembly with new one.

1-3 Torque limits

Descriptions		Size	kgf•cm	N•m	in•lbf
Starter system	Starter pawl	M5* [†]	60 - 90	6 - 9	50 - 80
	Starter centre shaft screw	M5*	30 - 45	3 - 4.5	25 - 40
	Starter case	M5	50 - 70	5 - 7	45 - 60
Ignition system	Magneto rotor (Flywheel)	M8	230 - 270	23 - 27	200 - 235
	Ignition coil	M4	60 - 90	6 - 9	50 - 80
	Spark plug	M14	130 - 170	13 - 17	113 - 150
Fuel system	Carburettor	M5	30 - 45	3 - 4.5	25 - 40
	Intake bellows	M5	60 - 90	6 - 9	50 - 80
Clutch	Clutch hub	LM 10	300 - 400	30 - 40	250 - 350
Engine	Crankcase	M5 [†]	60 - 90	6 - 9	50 - 80
	Cylinder	M5 [†]	70 - 110	7 - 11	60 - 95
	Cylinder cover	M5	60 - 90	6 - 9	50 - 80
	Muffler	M5*	70 - 110	7 - 11	60 - 95
	Muffler lid	M4	15 - 25	1.5 - 2.5	13 - 22
Others	Auto-oiler	M4	35 - 50	3 - 5	25 - 45
	Compression spring	Cushion bracket	M5	30 - 40	25 - 35
		Crankcase	M5	60 - 80	50 - 70
	Front handle		M5	40 - 60	35 - 50
			M6	40 - 50	35 - 45
	Rear handle	M5	40 - 60	4 - 6	35 - 50
	Brake lever (Hand guard)	Starter side	M5	30 - 50	25 - 40
		Sprocket side	M5	60 - 90	50 - 80
	Brake cover	M5*	40 - 60	4 - 6	35 - 50
	Sprocket guard plate	M4*	15 - 25	1.5 - 2.5	13 - 22
	Spike	M4	60 - 90	6 - 9	50 - 80
	Ignition switch	M10	15 - 30	1.5 - 3	13 - 25
	Guide bar	M8	200 - 230	20 - 23	175 - 200
Regular bolt, nut and screw		M3	6 - 10	0.6 - 1	5 - 9
		M4	15 - 25	1.5 - 2.5	13 - 22
		M5	25 - 45	2.5 - 4.5	22 - 40
		M6	45 - 75	4.5 - 7.5	40 - 65
		M8	110 - 150	11 - 15	95 - 130

LM: Left-hand thread

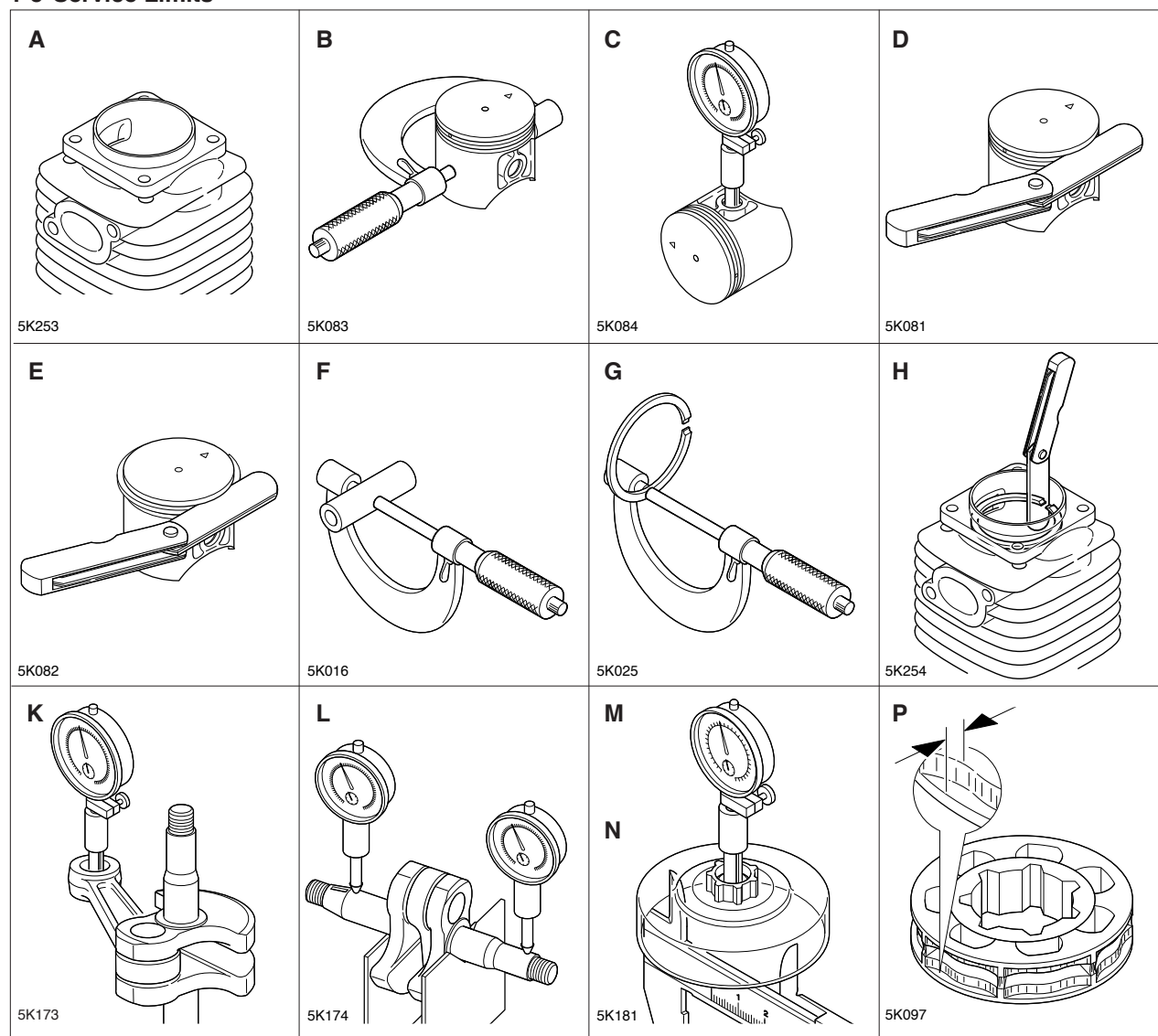
*Thread locking sealant (See next page)

[†] The torque difference between four bolts should not exceed 20 kgf•cm (2N•m, 17in•lbf) per bolt.

1-4 Special repairing materials

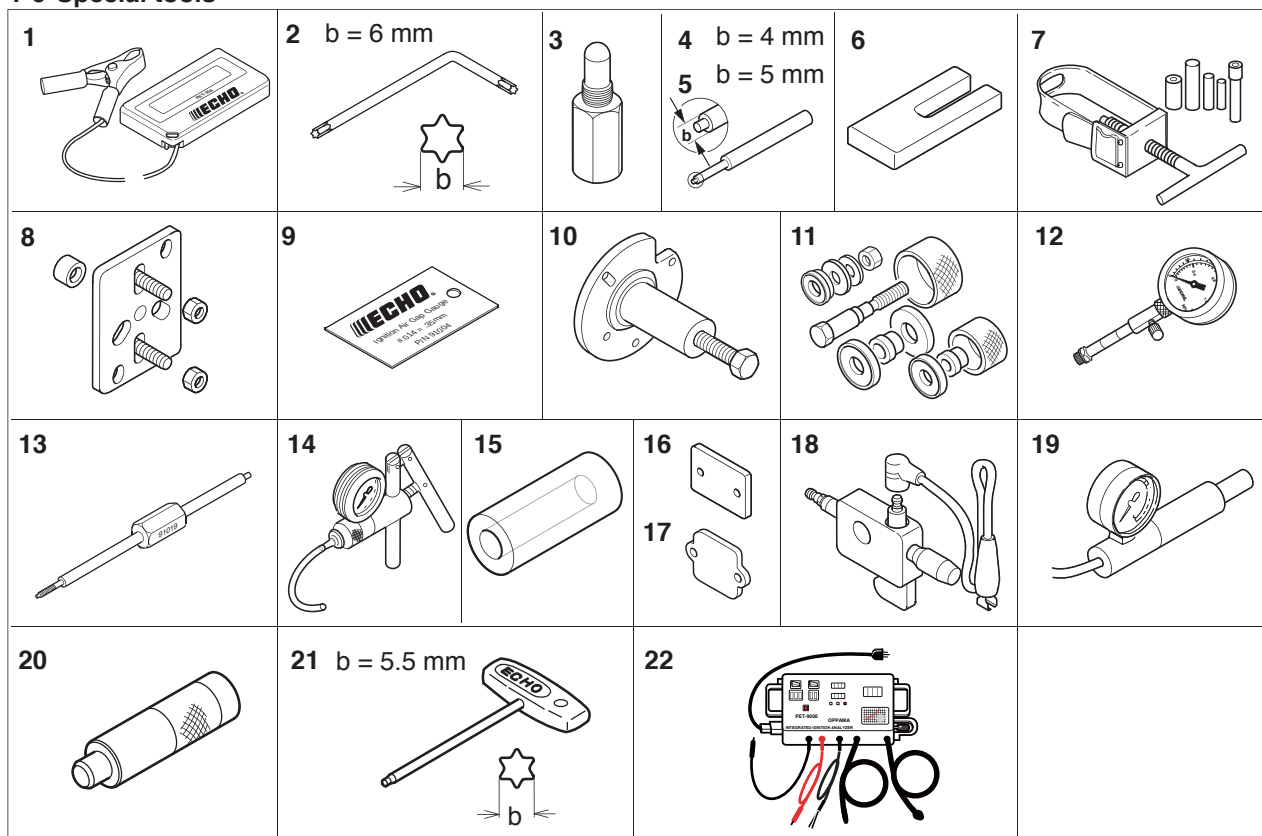
Material	Location	Remarks
Adhesive	Guide bar stud	Loctite #609, ThreeBond 1373 or equivalent
	Starter centre shaft screw	Loctite #222, ThreeBond1342 or equivalent
Grease	Auto-oiler worm	Lithium based grease or ECHO XTended Protection TM Lubricant
	Clutch needle bearing	
	Rubber cushion, inside	
	Choke knob	
	Rewind spring	
	Oil seal inner lips	
	Starter centre shaft	
	Brake cover	
	Chain brake (metal contact part)	Molybdenum grease (approx. 1 gram)
Thread locking sealant	Muffler	Loctite #242, ThreeBond #1324 or equivalent
	Sprocket guard plate	
	Starter pawl	

1-5 Service Limits



Description			mm (in)
A	Cylinder bore	When plating is worn and aluminum can be seen	
B	Piston outer diameter	Min.	44.90 (1.768)
C	Piston pin bore	Max.	11.030 (0.4343)
D	Piston ring groove	Max.	1.6 (0.063)
E	Piston ring side clearance	Max.	0.1 (0.004)
F	Piston pin outer diameter	Min.	10.98 (0.4323)
G	Piston ring width	Min.	1.45 (0.057)
H	Piston ring end gap	Max.	0.5 (0.02)
K	Con-rod small end bore	Max.	15.025 (0.5915)
L	Crankshaft runout	Max.	0.01 (0.001)
M	Sprocket bore	Max.	13.90 (0.5472)
N	Clutch drum bore	Max.	71.5 (2.81)
P	Sprocket wear limit	Max.	0.5 (0.02)

1-6 Special tools



Key	Part Number	Description	Used for:
1	G310-000050	Tachometer PET-304	Measuring engine speed to adjust carburettor
2	X605-000050	Torx L wrench (T27)	Removing and installing bolt
3	897537-30130	Piston stopper	Locking crankshaft rotation
4	897724-01361	Spring pin tool (4 mm)	Removing and installing spring pin (4 mm dia)
5	897724-02831	Spring pin tool (5 mm)	Removing and installing spring pin (5 mm dia)
6	897719-02830	Piston holder	Making piston steady to remove and install piston / rings
7	897702-30131	Piston pin tool	Removing and installing piston pin
8	897501-03938	Puller	Removing magneto rotor
9	91004	Module air gap gauge	Adjusting pole shoe air gaps
10	897502-19830	Crankcase tool	Separating crankcase
11	897701-14732	Bearing tool	Removing and installing ball bearings on crankcase
12	91037	Compression gauge	Measuring cylinder compression
13	91019	Limiter cap tool	Removing and installing limiter cap
14	91024	Pressure tester	Testing crankcase leakages
15	897726-16431	Oil seal tool	Installing starter side oil seal
16	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
17	897827-16131	Pressure plate	Plugging intake port to test crankcase / cylinder leakages
18	897800-79931	Spark tester	Checking ignition system
19	897803-30133	Pressure tester	Testing carburettor leakages
20	897714-12330	Oil seal tool	Installing crankcase side oil seal
21	X602-000340	Torx T wrench (T27)	Removing and installing bolt
22	900300	Ignition Analyzer : PET-9000	Measuring Ignition timing, Primary/Secondary voltage engine speed

2 CARBURETTOR ADJUSTMENT PROCEDURE

2-1 General adjusting rules

A. Before starting the unit for adjustment, check the following items.

1. The correct spark plug must be clean and properly gapped.
2. The air filter element must be clean and properly installed.
3. The muffler exhaust port must be clear of carbon.
4. The fuel lines, tank vent and fuel filter are in good condition and clear of debris.
5. The fuel is fresh (> 89 octane : RON) and properly mixed at 50 : 1 with "ISO L-EGD" or "JASO FC/FD" 2-stroke oil.
6. The recommended bar and chain must be installed, and properly tensioned.

NOTE : In order to achieve proper carburettor adjustment, a 50 cm bar and chain should be installed on the unit. Otherwise serious engine damage will occur due to overspeeding.

B. Adjustment with limiter caps on carburettor.

Set L and H mixture needles fully anticlockwise. Start and run engine for two minutes alternating engine speed between WOT for 5 seconds and idle for 5 seconds. Adjust idle speed screw to 2,800 +/- 150 r/min. Adjust H mixture needle with limiter cap to 12,500 +/- 300 r/min. If engine does not run correctly after this adjustment, proceed to the next step 2-2.

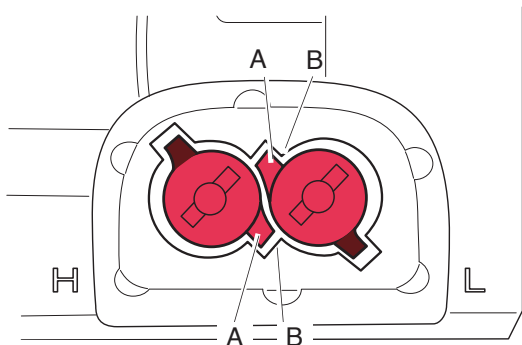
IMPORTANT : After adjusting carburettor according to the steps 2-2 and 2-3, the limiter cap(s) must be installed on L and H mixture needle(s) to comply with Emission Directive.

2-2 Presetting Idle adjust screw, L mixture needle and H mixture needle



Tools Required : Small screwdriver with 2.5 mm and 4 mm blade, electronic tachometer P/N G310-000050, limiter cap removal tool with 2.5 mm left-hand thread P/N 91019. Parts Required : (2) limiter caps P/N P003-000010.

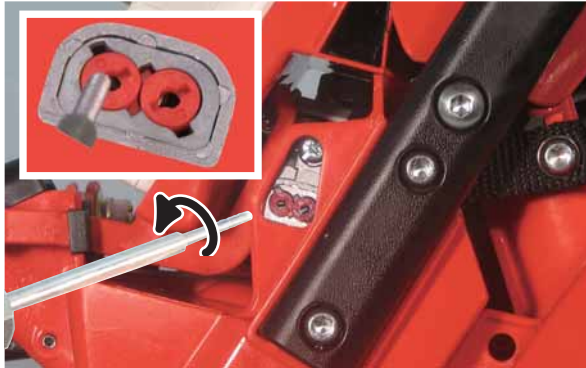
1. Turn the L and H mixture needles anticlockwise to rich side stop to align limiter cap tab (A) with locating slot (B), using 2.5 mm blade screwdriver.



NOTE : If cap tabs (A) misalign with locating slots (B), the cap cannot be removed and the centre hole threads will strip. If centre hole threads strip, use 3 mm diameter thread wood screw to remove the limiter cap.

(continued)

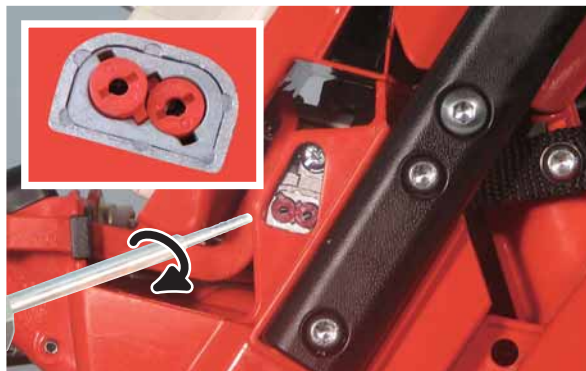
2-2 Presetting Idle adjust screw, L mixture needle and H mixture needle (continued)



2. Screw 2.5 mm limiter cap removal tool P/N 91019 anticlockwise into centre hole of either limiter cap until tab of the limiter cap just comes out of the locating slot.

NOTE : DO NOT COMPLETELY REMOVE LIMITER CAP FROM Carburettor!

If the first limiter cap is removed completely, the second limiter cap can be misaligned while inserting the cap removal tool.



3. Remove the limiter cap removal tool from the limiter cap by turning the tool clockwise, leaving the limiter cap in place.

4. Screw 2.5 mm limiter cap removal tool P/N 91019 anticlockwise into centre hole of remaining limiter cap until the limiter cap is removed from the mixture needle completely. Remove the limiter cap from limiter cap removal tool by turning clockwise, then screw limiter cap removal tool into centre hole of previous limiter cap to remove completely.

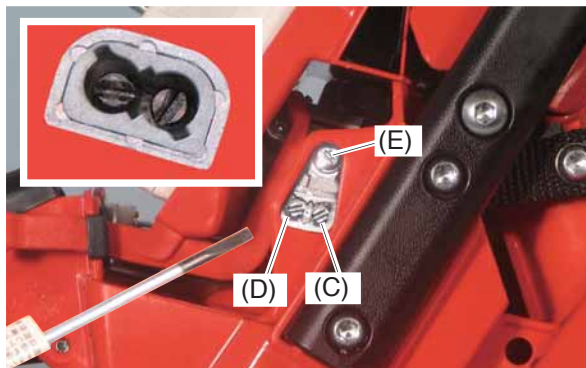


5. Turn L and H mixture needle clockwise until lightly seated, then turn both mixture needles anticlockwise for initial setting as follows :

L mixture needle (C) : $1 \frac{3}{4}$,

H mixture needle (D) : $\frac{3}{4}$

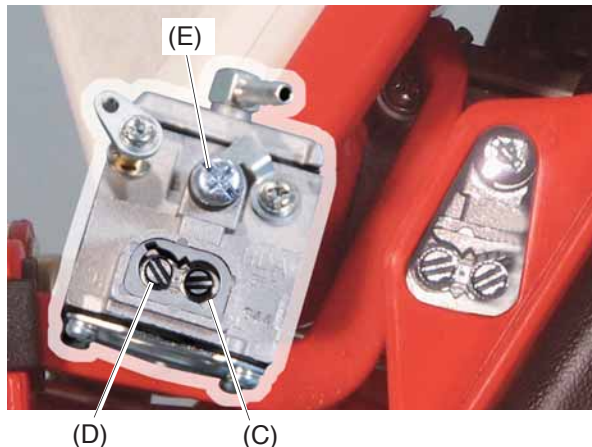
NOTE : If needles are forced during seating, damage to carburettor may occur.



6. Remove air cleaner lid and air filter to expose the Idle adjust screw (E) and throttle plate. Turn Idle adjust screw anticlockwise and set the screw until the tip just contacts the throttle plate. Then turn Idle adjust screw 1 turn clockwise. Reinstall air filter, and cleaner lid.

NOTE : The initial carburettor settings for Idle adjust screw, L and H speed mixture needles are intended to start and run the engine before final carburettor adjustments are made through this procedure. The actual number of turns needed for engine operation may vary.

2-3 Adjusting carburettor



1. Start and warm engine for 1 minute alternating engine speed between WOT and idle every 5 seconds. Turn H mixture needle (D) anticlockwise until engine speed drops to approx. 11,500 r/min at WOT.

NOTE : Do not run engine at high speed without load longer than 10 seconds, or engine damage may occur.

2. Adjust L mixture needle (C) using 2.5mm blade screwdriver to reach maximum engine speed just before lean speed drop off.

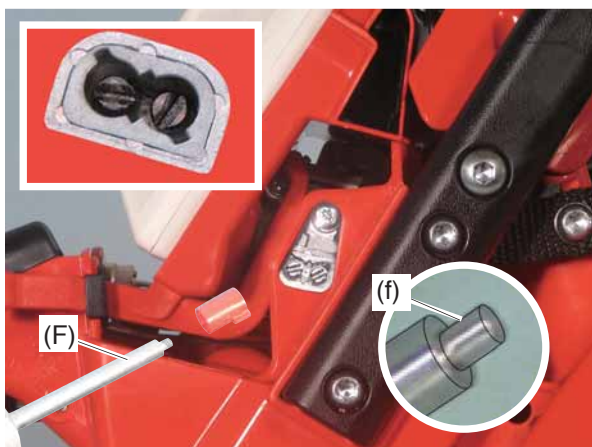
3. Set idle speed to 3,600 r/min by turning Idle adjust screw (E). Engine speed should be stable at 3,600 +/- 50 r/min after Idle adjust screw adjustment.

4. Turn L mixture needle (C) anticlockwise reducing engine idle speed 800 r/min to set idle speed at 2,800 r/min. The idle speed range is 2,750 - 2,850 r/min.

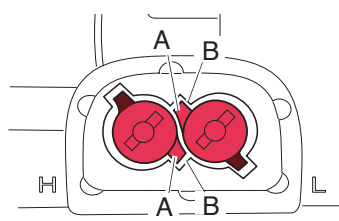
NOTE : Engine speed must be allowed to stabilize a minimum of 20 seconds after each adjustment of L mixture needle to assure accurate tachometer readings.

5. Before adjustment, WOT engine speed should be 11,500 r/min or less. If engine speed is higher, turn H mixture needle anticlockwise until 11,500 r/min is achieved. To make the final WOT engine speed adjustment, turn the H mixture needle clockwise in 1/8 turn increments with the engine at idle. After each adjustment, accelerate to WOT, and check speed. The final speed should fall within 12,100 - 12,300 r/min at WOT.

NOTE : When the H mixture needle is turned completely clockwise, the engine will continue to run. If the engine speed at WOT is above 13,300 r/min, adjust H mixture needle anticlockwise and set maximum engine speed at less than 13,000 r/min.



6. After adjusting carburettor, put new limiter cap on the other side (f) of limiter cap tool (F) as shown. Align the limiter cap's tabs (A) with locating slots (B) in extended housing of carburettor and press the limiter caps to the bottoms on L and H mixture needles respectively.



IMPORTANT : The limiter caps must be properly installed on L and H mixture needles to comply with Emission Directive.

7. Start engine, and verify engine idle speed ranges from 2,600 to 3,200 r/min, and WOT engine speed ranges from 11,800 to 12,800 r/min. Make sure the chain does not rotate when engine is idling. When final adjustment is completed, the engine should idle, accelerate smoothly, and attain WOT per above specifications.